ABSTRACT

An MTJ (magnetic tunneling junction) device particularly suitable for use as an MRAM (magnetic random access memory) or a tunneling magnetoresistive (TMR) read sensor, is formed on a seed layer which allows the tunneling barrier layer to be ultra-thin, smooth, and to have a high breakdown voltage. The seed layer is a layer of NiCr which is formed on a sputter-etched layer of Ta. The tunneling barrier layer for the MRAM is formed from a thin layer of Al which is radically oxidized (ROX), in-situ, to form the layer with characteristics described above. The tunneling barrier layer for the read sensor formed from a thin layer of Al or a HfAl bilayer which is naturally oxidized (NOX), in-situ, to form the barrier layer. The resulting device has generally improved performance characteristics in terms of GMR ratio and junction resistance.